DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY MEDICAL COMMAND
2050 WORTH ROAD
FORT SAM HOUSTON, TEXAS 78234-6000

REPLY TO
ATTENTION OF

MCPO-NCR

28 OCT 2004

MEMORANDUM FOR COMMANDERS, MEDCOM MAJOR SUBORDINATE COMMANDS

SUBJECT: Medical Management, Evaluation, Follow-Up, and Recording of Chemical Warfare (CW) Mustard Agent Casualties Outside of Storage, Demilitarization, and Research Settings

1. Reference: See Appendix A.

2. This memorandum supplements current doctrine (see Appendix A) on the medical management of mustard agent casualties, using the latest research, and it establishes a procedure for medical evaluation and long term follow-up of these casualties. Our knowledge about these agents continues to expand; this guidance ensures appropriate care for our personnel exposed to such agents.

3. Exposure to chemical weapons continues to pose a significant risk to our forces abroad and at home. This past July, two service members in Delaware suffered severe burns due to mustard agent leaking from an unexploded 75 mm artillery shell of World War I vintage. It is of paramount importance that our health care providers appropriately evaluate, manage, follow-up, report, and archive these cases.

4. Instructions for the medical management, evaluation, follow-up and recording of mustard agent casualties outside of industrial and research settings is provided in Appendix B. The effects of CW mustard agent are summarized in Appendices C and D. Certain other chemicals have comparable effects and exposures are managed similarly. Clinical questions concerning the evaluation and management of these exposures should be addressed to the US Army Medical Research Institute of Chemical Defense (USAMRICD); their 24-hour contact information is included in Appendix B.

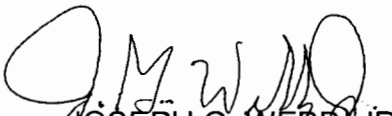
5. In all cases of mustard agent exposure, even in forward-deployed areas, blood and urine specimens must be sent to USAMRICD for testing and archiving; if shipment of samples is not possible in forward-deployed locations, symptomatic patients should be evacuated for this purpose when the mission allows. USAMRICD will send a portion of each sample to the Armed Forces Institute of Pathology for archiving. Urinary thiodiglycol testing at USAMRICD can assist health care providers in evaluating low-level exposures. Instructions for collection, handling, and shipment of clinical specimens are contained in Appendix E.

6. Command Surgeons will report chemical casualty information, using the format in Appendix F, through command channels to the US Army Center for Health Promotion and Preventive Medicine (USACHPPM). Directions for reporting, recording, and archiving information related to mustard agent exposures is located in Appendix B. USACHPPM will maintain an archive of this information, and will notify the Office of The Surgeon General (Current Operations) and the Deployment Health Clinical Center (DHCC).

7. Long-term annual follow-up of all confirmed exposures will be coordinated by the Deployment Health Clinical Center (DHCC) at Walter Reed Army Medical Center. Follow-up guidelines and DHCC's contact information is listed in Appendix B.

8. All primary care providers must become familiar with these guidelines. My point of contact for this memorandum is LTC John Rowe, Proponency Office for Preventive Medicine, john.rowe@otsg.amedd.army.mil, DSN 761-0022 or commercial (703) 681-0022.

FOR THE COMMANDER:



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Director, DoD Deployment Health Clinical Center, Walter Reed Army Medical Center, Bldg. 2, Room 3G04, 6900 Georgia Avenue NW, Washington, D.C. 20307-5001
Director, Armed Forces Institute of Pathology, 6825 16th Street NW, Washington, DC 20306-6000

Appendix A. References

1. Field Manual 8-285, Treatment of Chemical Casualties and Conventional Military Chemical Injuries, 22 Dec 95, http://www.army.mil/usapa/doctrine/8_Series_Collection_1.html.

2. Textbook of Military Medicine, Part I: Medical Aspects of Chemical and Biological Warfare, Office of The Surgeon General, 1997, https://ccc.apgea.army.mil/sarea/books.asp#tmm.

3. Medical Management of Chemical Casualties Handbook, U.S. Army Medical Research Institute of Chemical Defense, http://ccc.apgea.army.mil.

4. Technical Guide 244, Medical NBC Battlebook, US Army Center for Health Promotion and Preventive Medicine (USACHPPM), July 1999, https://ccc.apgea.army.mil/sarea/books.asp#tmm.

5. Memorandum, MCM-0026-02, The Joint Chiefs of Staff (JCS), 29 Apr 02, Subject: Chemical Warfare (CW) Agent Exposure Planning Guidance.

6. Memorandum, MCM-0006-02, JCS, 1 Feb 02, Subject: Updated Procedures for Deployment Health Surveillance and Readiness.

7. Tri-service Reportable Medical Events, Guidelines and Case Definition Version 1.0, Army Medical Surveillance Activity, Jul 98. http://amsa.army.mil/documents/DoD_PDFs/Jul98TriServREGuide.pdf

8. Clinical Practice Guideline for Post-Deployment Health Evaluation and Management, Dec 01, http://www.pdhealth.mil/guidelines/default.asp.

9. Presidential Review Directive (PRD) 5, Planning for Health Preparedness for and Readjustment of the Military, Veterans, and Their Families After Future Deployments, Aug 98.

10. TB Med 296, Assay Techniques for Detection of Exposure to Sulfur Mustard, Cholinesterase Inhibitors, Sarin, Soman, GF, and Cyanide, May 96, http://chppm-www.apgea.army.mil/documents/TBMEDS/TB%20MED%20296.pdf.

11. Department of Defense Instruction (DoDI) 6490.3, Implementation and Application of Joint Medical Surveillance for Deployments, 7 Aug 97, http://www.dtic.mil/whs/directives/corres/pdf/i64903_080797/i64903p.pdf.

12. DoDI 6055.5, Industrial Hygiene and Occupational Health, with change 1, May 96. http://www.dtic.mil/whs/directives/corres/pdf/i60555wch1_011089/i60555p.pdf

13. J.L. Willems, Clinical Management of Mustard Gas Casualties, Ann. Med. Militaris Belgicae 1989, 3 S1: 1–61, https://ccc.apgea.army.mil/sarea/books.asp#tmm.

Appendix B. Instructions for Medical Management, Evaluation, Follow-Up, and Recording of Mustard Agent Casualties Outside of Storage, Demilitarization, and Research Settings

B-1. Purpose. This guidance establishes procedures to evaluate and treat individuals exposed to chemical warfare (CW) mustard agents or other vesicants during operations. It supplements current Department of the Army doctrine with treatment recommendations from the most recent research, and it establishes procedures for medical evaluation and long term follow-up of these casualties. It establishes a clinical specimen archive and a requirement for submission of reports so that information related to such exposures may be archived by the United States Army Center for Health Promotion and Preventive Medicine (USACHPPM).

B-2. Applicability. This guidance applies to all Department of Army personnel, including government civilian employees, contractors, and volunteers accompanying US forces.

B-3. Guidelines.

a. Initial Medical Evaluation and Treatment. The care of personnel potentially exposed to CW mustard agents is in accordance with references 1 through 4 in Appendix A, supplemented by consultation with the US Army Medical Research Institute of Chemical Defense (USAMRICD) and the US Army Institute of Surgical Research (USAISR) as needed (see paragraph B-3.l.).

b. Additional Considerations for Treatment. In addition to the treatment recommendations noted in the references, there is recently discovered information that directly impacts the treatment of these casualties. These observations come from ongoing animal research dealing with the management of mustard injuries and observation of accidents that have occurred with sulfur mustard, and from mustard casualties from World War I (WWI) and from the Iran/Iraq conflict in 1982-1988.

(1) Eye Exposures.

(a) Research at the USAMRICD with rabbits exposed to sulfur mustard showed remarkable results using combination steroid and antibiotic ophthalmic preparations. Eyes that would have been all but destroyed appeared almost normal when these combinations were applied early and frequently. In the study, they were given both by injection and topically in the form of solutions and ointments. These dramatic results led to the recommendation that commercially available **ophthalmologic steroid/antibiotic solutions or ointments be used as soon as possible after all mustard eye injuries, even the mildest, and reapplied every one to two hours until the full extent of the developing mustard injury becomes known**. The treatment should then be modified accordingly, with consultation and examination by an ophthalmologist at the earliest opportunity. This initial treatment would be applied only in the absence of a penetrating eye injury or obvious secondary bacterial infection. Eye pain could be severe enough to require narcotic analgesia.

(b) Providers should be aware that exposure to sulfur mustard can lead to a chronic eye inflammation with associated pain, erosions, and even frank ulceration. Keratitis has been seen to develop as early as 8 months and as late as 20 years after initial exposure. It does not seem to be associated with severity of exposure, although one would expect a higher incidence with more severe exposures.

(2) Respiratory Exposures.

(a) No specific antidotes for the mustard injury to the lung exist, however, extensive supportive care is often needed for pulmonary injuries. Pulmonary edema is not a normal feature of the mustard lung injury, except in the case of very large exposures where hemorrhagic pulmonary edema may be seen.

(b) The respiratory manifestations of mustard exposure are similar to smoke inhalation injury in that secondary bronchopneumonia is common. **High-frequency percussive ventilation** is prophylactic against pneumonia following smoke inhalation injury and this modality should be employed for mustard exposures requiring intubation and mechanical ventilation.

(c) Mustard injuries in the trachea and bronchi have a high rate of secondary bacterial infection starting as early as three days and developing as late as two to three weeks after exposure. The late development is especially frequent with doses leading to significant bone marrow depression. **Prophylactic administration of antibiotics is contraindicated and will lead to the selection of resistant bacterial infections.** Health care providers must vigilantly watch for the earliest signs and symptoms of infection. Antibiotic selections are based on cultures and Gram stain.

(d) The sloughing of the necrotic bronchial mucosa and pseudomembranes can be severe enough to cause mechanical blockage and suffocation. Treatment is **rigorous percussion and postural drainage and provision of humidified air with supplemental moisturized air/oxygen.** At times, **fiberoptic bronchoscopy** may be needed to remove the blockage. Soldiers in WWI died from these blockages.

(e) A complication not reported from WWI, but seen in casualties from the Iran/Iraq War in the 1980s, was severe tracheobronchial stenosis, which may be irreversible.

(f) Bronchospasm with asthma-like symptoms can be a frequent complication of the mustard lung injury. The medicines used for the bronchospasm are the same as in asthma: beta adrenergic dilators, steroids, etc. Steroid anti-inflammatory agents have never been shown scientifically to be beneficial in cases of mustard lung injury. However, if beta adrenergic bronchodilators are not providing complete relief, many physicians would be quick to add steroids to aid in reducing the bronchospasm. Again, caution is warranted because of the likelihood of secondary bacterial infection in cases of exposure to sulfur mustard.

(g) With significant irritation to the larynx, acute closure caused by laryngospasm is possible and could result in death if a patent airway is not maintained.

(h) Long term effects. Mounting circumstantial evidence suggests the possibility of chronic bronchial disease developing after significant pulmonary exposure. Also, mustard is a proven carcinogen, although no cases of cancer have been documented with acute exposures. Some factory workers chronically exposed to low doses of sulfur mustard in WWI developed cancers of the respiratory tract (nasopharynx, larynx, and lung). Limited animal data and anecdotal reports from Iran and Iraq suggest the possibility of reproductive abnormalities, however this will take years to substantiate. The possibility of a causal link between mustard exposure and late onset or chronic health effects should always be investigated in patients with a documented or suspected history of exposure.

(3) Skin Exposures.

(a) In general, mustard skin burns are more superficial than thermal burns, however intensive care or surgical burn unit care are frequently needed. Judicious intravenous fluid and electrolyte therapy is required with significant mustard skin burns, but fluid requirements are less than with corresponding thermal burns. Fluids and electrolytes should be closely monitored, as fluids may be lost to edematous areas, with resultant dehydration. Medical personnel are cautioned not to over-hydrate the patient, as hypervolemia and pulmonary edema can be iatrogenically induced in mustard casualties. The exact fluid replacement requirements for cutaneous mustard injuries should be based on patient status and considered on a case-by-case basis.

(b) Vesication may take several days to complete. **Mustard blister fluid does NOT contain active sulfur mustard.** Once a patient has been adequately decontaminated medical personnel do not have to fear contamination.

(c) Multiple techniques exist for managing mustard skin injuries: (1) leaving the blisters intact; (2) removing/debriding the roof of large blisters; (3) leaving the blister roof intact with sterile needle aspiration of the fluid; and (4) removing the blister roof with temporary placement of artificial or pig skin. A universal measure is the use of a **topical antibiotic cream or ointment whether the blister is intact or not**. The topical antibiotic depends on individual experience and preference; the traditional surgical preparations such as **silver sulfadiazine is preferred.** Mafenide acetate causes unnecessary pain when applied to second degree burns and should be reserved for deep and insensate burns. Most mustard vapor burns are second degree, often complicated by infection; liquid contact can cause third degree burns. A moist wound healing environment should be maintained during the re-epithelialization process for optimal outcome. Initially, the attachment of the neoepidermis to the underlying dermis may be weak, and protective dressings may be needed to avoid or minimize damage as a result of friction with clothing or bedding.

(d) Mustard skin wounds can easily develop a secondary bacterial cellulitis requiring the use of appropriate systemic antibiotics. Sulfur mustard causes tremendous inflammation in human skin; this can easily be confused with bacterial cellulitis. Infection surveillance and specialty consultation may be necessary.

(e) Mustard casualties with skin injury may require narcotic analgesia.

(f) It has long been recognized that mustard skin wounds are slow to heal, taking sometimes twice the time that would be expected with a conventional wound or a thermal burn. The hypothesis explaining these observations is that abnormal compounds of DNA (DNA adducts) are produced, delaying the healing time. Also, the skin histologically very often looks more like scar tissue than normal skin. Recent studies in the United States (USAMRICD) and England (Porton Down) have shown that **appropriate debridement** of the deeper mustard burns leads to more normal healing times and return to regular skin architecture. Good results were obtained with both laser debridement and traditional mechanical techniques. Accurate depth assessment is important, because it dictates how aggressive treatment needs to be to minimize or prevent cosmetic and functional deficits (e.g., deep injuries will need to be excised and grafted). Microcutaneous blood flow is a good prognostic indicator and should be monitored using **laser Doppler perfusion imaging or indocyanine green fluorescence imaging**, if available.

(g) Surgeons are encouraged to contact the USAMRICD or the US Army Institute of Surgical Research (ISR) should the need arise. Contact information is listed in B-3.I., below.

(4) Bone Marrow Effects.

(a) Sulfur mustard, like nitrogen mustard and certain chemotherapeutic compounds, is an alkylating agent. Systemic absorption of sulfur mustard usually above 25% of a lethal dosage can lead to significant bone marrow depression. This is why the systemic effects of sulfur mustard sometimes have been described as radiomimetic. The earliest indicator that a patient may have received a significant systemic exposure is nausea and vomiting persisting longer than the first hour or two after exposure. Nausea and vomiting 24 hours later is a definite warning sign. The next most sensitive indicator is **a fall in the lymphocyte count**; this lymphopenia may occur as early as the first 24 hours. The polymorphonuclear cell count may actually rise in the first 24 hours. Other cellular components of blood may show a significant decline as early as three days after exposure, and patients can be in profound marrow suppression by one to three weeks following exposure. The usual life-threatening complications are sepsis and septic pneumonia. **Transfusions, isolation techniques, hormonal stimulation of the marrow and appropriate antibiotics** may all be used.

(b) Studies in the non-human primates by the Navy using nitrogen mustard and by the Army with sulfur mustard showed an improved bone marrow recovery time using **granulocyte colony stimulating factor (GCSF)**. GCSF is a commercially available product for use in more standard cases of marrow suppression. Physicians are encouraged to contact USAMRICD should the need arise

(5) Gastrointestinal Effects. Severe hemorrhagic diarrhea may be caused either by direct ingestion of sulfur mustard or by systemic absorption following exposure by other routes. High doses of sulfur mustard can induce a necrosis and sloughing of the gastrointestinal mucosa. The most important aspect of treatment is the appropriate

administration of IV fluids and electrolytes. **Anticholinergics** to control bowel spasm and possibly narcotic analgesia are indicated as long as an acute surgical abdomen is not a complication. Hemorrhage can be severe enough to require transfusion.

(6) Central Nervous System Effects. In the first few hours of exposure to sulfur mustard, patients can experience mood swings ranging from depression to euphoria. The mechanism for these mood changes is not understood. Supportive care is indicated. A few individuals in WWI who received massive exposures to sulfur mustard experienced seizures and died rapidly. This same phenomenon has been observed in animals.

c. Laboratory Testing. All cases of mustard agent exposure, even in forward-deployed areas, must have blood and urine specimens sent to the USAMRICD for testing and archiving. If shipment of samples to USAMRICD is not possible from forward-deployed locations, symptomatic patients should be evacuated for this purpose as the tactical situation permits. USAMRICD will send a portion of each sample to the Armed Forces Institute of Pathology (AFIP), Division Biophysical Toxicology for archiving in the CW Agent Registry for possible future analysis.

(1) Urinary thiodiglycol testing at USAMRICD can assist health care providers in evaluating and confirming low-level or suspected (potential) exposures. An individual is considered potentially exposed if either there is: (a) a positive mustard agent detection as a result of an automated test/alarm, a positive hand held field test, or as a result of other approved sampling and analysis judged to be accurate and performed in accordance with appropriate guidelines indicating possible presence of a mustard agent; (b) when intelligence or other operational reporting or a commander determines that mustard agent exposures may have occurred; or (c) when an individual exhibits signs and/or symptoms consistent with mustard agent exposure.

(2) The urine specimen should be collected as soon as possible after exposure, **frozen**, and transported to USAMRICD in accordance with Appendix E.

(3) A blood specimen (lavender-top tube) should be taken as soon as possible after exposure and placed on ice (2-8 degrees Celsius; **not frozen**) and sent to USAMRICD (memory aid: "**FUBR**" stands for "**F**reeze **U**rine; **B**lood **R**efrigerate"). The USAMRICD will split each sample and send a portion to AFIP for archiving. If thiodiglycol testing is done in theater, this does not eliminate the need to ship a specimen to USAMRICD for analysis and archiving at AFIP, as noted above.

(4) Complete guidelines for the collecting, handling, and shipping of blood and urine from patients exposed mustard agents are located in Appendix E. Instructions for collecting and shipping to all types of chemical warfare agents are located at http://ccc.apgea.army.mil, or http://chemdef.apgea.army.mil. Ensure clinical information accompanies the specimens as outlined in Appendix F.

d. Guidelines for Return to Duty.

(1) Return to duty should be delayed until after full recovery. Temporary duties during convalescence should be appropriate to the patient's condition while awaiting full return to duty or medical retirement.

(2) Due to the slow healing properties of sulfur mustard injuries, any casualties with significant injury to the eyes, respiratory tract, skin, gastrointestinal tract, or central nervous system will usually not return to duty for weeks to months.

(a) Eye Injuries. Only the mildest eye irritations to sulfur mustard, those requiring perhaps only moisturizing eye drops, will be able to return to duty immediately. Even mild conjunctivitis can cause a functional blindness due to pain, photophobia, and spasm of the eyelid muscles; this conjunctivitis takes an average of two weeks to resolve. As the severity of the injury increases, so does the time for healing. A moderate conjunctivitis may require a full two months before return to duty is possible. In a few rare instances, blindness may result from severe exposures.

(b) Lung Injuries. Only those individuals experiencing an irritation without significant tissue injury will be able to return to duty. Determining who has received only an irritation or the mildest of injuries will generally require observation from three to seven days. Anyone with documented mustard lung injury producing a bronchial pneumonia or pseudomembrane formation will not be able to return to duty for several months. Severe cases may never return to duty.

(c) Skin Injuries. Return to duty will require weeks to months in all but the mildest of skin injuries. Only small surface areas (less than 5 percent) in non-critical areas will be able to quickly return to duty following treatment with topical antibiotic, dressings, and oral analgesics. Burns to the hands, feet, face, axillae, and groin are all potentially disabling. A recent accident victim required hospitalization in a burn center for burns on an arm and leg amounting to 6% body surface area. The disability caused by such a relatively small surface area was remarkable. Burns by liquid on the skin and in the eye cause the most severe injury. It is possible in some instances to receive a nearly total body burn with mustard vapor with effects no more severe than those from a second-degree sunburn. A vapor burn of this mild level of severity would take 48 or more hours to develop. However, a vapor burn developing in only a few hours could be as severe as a liquid burn. Severity of a mustard burn is dependent upon the total absorbed dose of vapor and liquid.

e. Guidelines for Medical Evacuation.

(1) Evacuation of mustard agent casualties out of theater for definitive care, evaluation and follow-up should be performed for all mustard agent casualties requiring hospitalization, for those requiring specialty care not available in theater, and for those requiring intensive care or burn center treatment.

(2) The depth and severity of burns caused by mustard exposure are deceiving in that these injuries will take much longer to heal than a comparable thermal burn injury. Evacuation, rather than observation should be undertaken in questionable cases.

(3) Only the most minimally exposed casualties will not require hospitalization, including those with less than %5 body surface area burns in non-vital areas (vital areas include the face, groin, and eye), and those with slight upper respiratory complaints of a hacking cough and irritated throat which developed at least 12 hours after exposure.

(4) Current policy is to evacuate all burn casualties, including those with chemical burn injury due to mustard exposure, to the USAISR (Army Burn Center) in San Antonio. Communication and consultation with the USAISR is encouraged for any questions regarding the forward management or transfer of burn casualties, including mustard casualties with skin manifestations.

f. Definitive Medical Evaluation for Medically Evacuated Mustard Agent Casualties.

(1) Medically evacuated soldiers should have a thorough medical evaluation, to include dermatologic, ophthalmologic, and/or burn surgical examinations on admission. Serial evaluations should focus on any abnormalities until they have resolved with time and appropriate treatment. Patients with injuries involving specific organ systems (for example the eyes, the respiratory tract, the gastrointestinal tract, the blood, or the central nervous system) should receive consultative care by the appropriate specialists.

(2) Proper mental health care which emphasizes the expectation of successful recovery and full return to duty should be included in the care plan.

g. Long Term Follow-Up Evaluation for All Mustard Agent Casualties.

(1) All confirmed mustard-exposed casualties (not just those requiring medical evacuation) will undergo a process of long term follow-up evaluation initiated by their primary care provider, after coordination by their primary care provider with the DoD Deployment Health Clinical Center (DHCC), and continued by the DHCC as described below. Information for contacting the DHCC is listed below. The DHCC coordinates and/or provides services only for eligible beneficiaries of the military healthcare system. The primary care provider and the DHCC will coordinate and/or consult with the USAMRICD and the USAISR to ensure appropriate care is provided. Symptomatic patients or those with residual effects of mustard exposure will receive their follow-up evaluations at the USAISR.

(2) After full recovery, the patient should have follow-up evaluations by their primary care provider every six months with appropriate studies for specific injuries. If problems are found at follow-up visits, appropriate care should be given with return visits as frequently as necessary. Once a patient has had two six-month follow-up visits without problems arising, he or she should start annual follow-up. Any associated medical problems will extend the period of close follow-up until complete resolution or maximal medical improvement.

(3) Patients with a mustard eye injury should have ophthalmologic evaluations every five years (and more frequently as necessary) for the rest of their lives.

(4) Patients with mustard lung injury to the respiratory tract (including any of the nasopharynx, larynx, trachea, and lung) should have a pulmonologic evaluation as indicated, but at least every five years, for life.

(5) Patients who have recovered from pancytopenia caused by sulfur mustard should have a hematologic evaluation as indicated, but at least every five years, for life.

(6) Once a patient has no mustard agent-related symptoms and has had normal studies at annual follow-up, the patient should be followed annually with a medical history, which can be done telephonically, and based on the results of the medical history, a physical examination directed toward any new-onset symptoms should be performed. The DHCC will coordinate these annual follow-up procedures.

(7) Patients having questions or needing annual follow-up can contact the Deployment Health Clinical Center at (800) 796-9699, e-mail pdhealth@amedd.army.mil, or visit their web site at http://www.pdhealth.mil/.

h. Medical Records Documentation.

(1) Mustard agent-exposed persons who have been evaluated/treated by medical personnel must have this evaluation/treatment documented in their individual medical records. This includes documentation of International Classification of Diseases, 9th Edition (ICD-9), category 989, "Toxic effect of other substances, chiefly nonmedicinal as to source" reportable events due to clinically observed CW agent effects as well as notation of any negative findings when medical evaluation indicates that an individual was likely not exposed to chemical agent. This must also include documentation of any treatments/antidotes given. Command Surgeons should ensure that all potentially exposed persons receive appropriate medical evaluation/treatment.

(2) Laboratory assays such as urinary thiodiglycol are not required for the ICD-9 989, case definition, which defines chemical agent exposures based on clinical observation of signs compatible with agent exposures such as those described in Appendices C and D. Results of any such tests should be documented in the individual's medical record.

i. Reporting and Archiving of Potential Mustard Agent Exposures.

(1) JCS memoranda MCM-0026-02 and MCM-0006-02 (references 5 and 6, respectively) establish the requirement to ensure that deployment health surveillance and readiness documentation requirements are met following a suspected or actual CW incident. This documentation includes identifying information for individuals that are exposed or possibly exposed to CW agent (protected or unprotected) their location, time, hazard area, and all monitoring results (to include those within standards).

(2) The treating physician will report potential chemical agent exposures through command channels. The Command Surgeon will obtain the following information and report it, using the format located in Appendix F, through command channels to USACHPPM as described below.

(a) All theater area NBC reports (initial and follow on, i.e., NBC 1,2,3,4,5,6), situation reports (SITREPS), and related confirmatory data (from NBCWRS/ G3/OPS-NBC). At a minimum data must include unit, location, date/time group of incident, type of CW event suspected/confirmed, and sampling type and location if available.

(b) All unit personnel data and personal identifiers; name, rank, SSN, and unit identification (Unit Identification Code, if known).

(c) All CW agent-related casualty treatment. This includes ICD-9 989 reportable events based on clinically observed CW agent health effects, whether or not treatment was provided. Medical personnel must also document any negative findings in individual records when medical evaluation identifies no physical findings supportive of chemical agent exposure.

(3) Command Surgeons will evaluate and compile data and perform initial assessments of units/personnel potentially exposed or at risk and forward copies of data (both field detector data and confirmatory laboratory data), as well as data summaries, final reports, and investigations related to CW agent events through command channels to USACHPPM – contact information is below. USACHPPM will archive a report based on data provided. Contact information for USACHPPM is as follows:

US Army Center For Health Promotion and Preventive Medicine
ATTN: MCHB-TS-RDE
5158 Blackhawk Road
Aberdeen Proving Grounds, MD 21010-5422
1-800-222-9698, DSN 584-6096; or commercial (410) 436-6096
Secure DSN 584- or commercial 410-436-4244
Secure email: OEHdata@usachppm.smil.mil
Secure web server: usachppm1.army.smil.mil

(4) The USACHPPM will acknowledge receipt of these reports to the Office of The Surgeon General, ATTN: Current Operations (703-681-8052, DSN 761, OPNS@otsg.amedd.army.mil). USACHPPM will also forward the information to the Deployment Health Clinical Center at Walter Reed Army Medical Center. USACHPPM maintains information on all types of deployment-related exposures in the Deployment Environmental Surveillance Program (DESP), the designated DoD data repository for all deployment-related occupational and environmental health surveillance data. The DESP will coordinate with the Army Medical Surveillance Activity to ensure that all medical data is coordinated and archived in the Deployment Medical Surveillance System (DMSS), the designated DoD data repository for all medical surveillance data.

(5) The AFIP (Division Biophysical Toxicology) will maintain an archive of serum and RBC samples from all suspected CW exposed cases. The archive will be maintained under the CW Agent Registry.

j. Health Risk Communication. The physician or other medical provider will inform each potentially exposed patient of the clinical impression and the purpose of any evaluation or treatment procedures and of any results when they become available. Health risks associated with the intensity and duration of exposure and with the degree of signs/symptoms will be communicated to the individuals. All laboratory results will be entered into the individual medical records. Health care providers are encouraged to use the resources listed in Appendix A, and to contact the USAMRICD when questions arise, at (410) 436-2230 /4484 /3276.

k. Post-Deployment Health Assessments (DD Form 2796). When the DD Form 2796 is completed, the appropriate health care provider will follow-up on the mention of any potential mustard agent exposure. Personnel will be referred for further medical evaluations in accordance with redeployment clinical practice guidelines and this memorandum. The DD Form 2796 will be annotated and documented in the medical records.

l. Consultative Services and Further Information. Training in the medical management of mustard agent casualties may be obtained from the Medical Management of Chemical and Biological Casualties Course, 6H-F26/877,879 or the Field Management of Chemical and Biological Casualties Course, 6H-F27/322-F27. These courses are offered by the USAMRICD. The USAMRICD Chemical Casualty Care website, http://ccc.apgea.army.mil contains further information. Contact the USAMRICD Chemical Casualty Care Division for consultation at their office (410) 436-2230 /4484/3276, cell phone (410) 322-6808, or e-mail ccc@apg.amedd.army.mil. For advice on burn care, contact the USAISR at (210) 916-3219/2720, by e-mail at army.burncenter@amedd.army.mil, or visit their website at http://usaisr.amedd.army.mil.

Appendix C. Summary of Mustard Vapor Effects

Organ	Severity	Effects	Onset Time (First Effects)
Eye	Mild	Tearing, itchy, burning, gritty feeling	4-12 hours
	Moderate	Above, plus reddening, swelling of lids, moderate pain	3-6 hours
	Severe	Marked swelling of lids, possible corneal damage, severe pain	1-2 hours
Airways	Mild	Runny nose, sneezing, nosebleed, hoarseness, hacking cough	12-24 hours
	Severe	Above, plus severe productive cough, shortness of breath	2-4 hours
Skin	Mild to Severe	Erythema (redness), blisters	2-24 hours

Reference: *Medical Management of Chemical Casualties*, USAMRICD, Third Edition, July 2000.

Appendix D. The Sequence of Skin Changes Due to Mustard Agent Exposure

Erythema (2-48 hour post exposure).	Reminiscent of scarlet fever. Slight edema of the skin. Intense itching. As the erythema fades, areas of increased pigmentation are left. (This sequence is reminiscent of that seen in sun burn.)
Blistering (for higher doses, starts 4 - 24 hours after exposure) (blistering can go on for several days)	Blisters are not, per se, painful, though they may be uncomfortable and feel tense. Mustard blisters are delicate and may be easily ruptured by contact with bed linen, bandages or during transport of casualties. Crops of new blisters may appear as late as the second week post exposure. Blister fluid is not dangerous and does not produce secondary blistering if applied to skin.
Deep burning leading to full thickness skin loss.	Likely to occur on the penis and scrotum.

Reference: *Medical NBC Battlebook*, USACHPPM TG 2444, July 1999.

Appendix E. Sample Collection, Handling, and Shipment: Excerpt from the US Army Medical Research Institute for Chemical Defense (USAMRICD) Standing Operating Procedure for Obtaining, Handling, and Shipping Biomedical Samples

IMPORTANT

THIS DOCUMENT WILL BE PERIODICALLY UPDATED. PLEASE ROUTINELY CONSULT THE CHEMICAL CASUALTY CARE WEBSITE (http://ccc.apgea.army.mil) OR US ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE PERSONNEL FOR THE MOST CURRENT PROCEDURES

E-1. Purpose and Applicability

Assay techniques for detection of chemical warfare agents in biomedical samples are described in TB MED 296. The purpose of this document is to provide information on procedures for obtaining, handling, and shipment of biomedical samples for analysis as described in TB MED 296 at the USAMRICD. **Note that analytical methodologies utilized for sample analysis are for forensic investigational purposes only. They are not Food and Drug Administration-approved clinical procedures and are not intended to provide the physician with information to implement or modify treatment.** The procedures apply only to the detection of chemical agents in biomedical fluids.

E-2. Sulfur Mustard, Lewisite:

A. Samples to be Collected:

1. Urine Sample – Mandatory: Urine is the primary sample needed to confirm sulfur mustard or lewisite exposure, and is needed for archival purposes. USAMRICD will split the sample and send a portion to Armed Forces Institute of Pathology (AFIP) Division Biophysical Toxicology for archiving. Obtain urine according to the procedures outlined below in paragraph E-3.C., Urine Sample Collection.

2. Blood Sample – Mandatory: A blood sample is needed by USAMRICD primarily for archival purposes. USAMRICD will split the sample and send a portion to the AFIP Division Biophysical Toxicology for archiving and possible future analysis. Blood should be obtained according to the procedures outlined in paragraph E-3.B., Blood Sample Collection.

E-3. Collection of Samples: Collect all biomedical samples under close supervision of a qualified health care provider or physician to prevent contamination, tampering, or mislabeling. Place a tamper-proof strip across the container and clearly mark the container with the patient's name, social security number, and date, with the patient's

initials. Initiate a chain-of-custody form (DD Form 1911) at the time the samples are generated.

A. Biomedical Sample Collection Kit: A list of items necessary for collection of samples can be found below in paragraph E-6., Biomedical Sample Collection Kit. Most materials are readily available from medical units. If materials cannot be obtained, contact the USAMRICD (see paragraph E-4.B., Contact Information), and a Biomedical Sample Collection Kit can be shipped. NOTE: Shipment can only be made to authorized Military Health Care Providers.

B. Blood Sample Collection: Handle the samples cautiously from the start of the collection to maintain integrity and preclude the possibility of contamination, tampering, or mislabeling. Collect all samples under the close supervision of a health care provider/physician as soon as possible following the suspected exposure.

1. Minimum Volume: At least 2 ml of blood are required for analysis.

2. Anticoagulant: Blood should be drawn into Vacutainers containing ethylenediaminetetraacetic acid (EDTA) as an anticoagulant (lavender-top tubes).

3. Shipping Method: Keep blood samples refrigerated (not frozen) and ship with adequate ice packs to maintain samples as cold as possible without freezing. If immediate shipping is not possible, store the blood sample refrigerated.

4. Documents to be Included with the Package:

a. Incident Report Form (Appendix F)

b. DD Form 1911 – Chain of Custody (page E-6)

C. Urine Sample Collection: Obtain urine samples to confirm suspected exposure to mustard agent. Collect urine samples under the close supervision of a health care provider and ensure appropriate handling so as to minimize chances for contamination from the environment or handling personnel. Collect urine immediately following suspected exposure or at the earliest possible time. Collect urine in clean urine cups that will not break when frozen (plastic material; allow room for expansion).

1. Minimum Volume: Attempt to obtain and send at least 100 ml of urine.

2. Shipping Method: Ship all urine samples with dry ice so they remain frozen.

3. Documents to be Included with the Package:

a. Incident Report Form (Appendix F)

b. DD Form 1911 (Materiel Courier Report) – Chain of Custody (page E-6)

4. Special Considerations: Permit enough air space in the container to allow for sample expansion during freezing. Sample containers made of non-breakable plastic, which can withstand cryogenic temperatures, should be used during shipping.

E-4. Shipping of Samples: Approval must be obtained prior to shipment of samples. Authorization can be obtained by phone or E-mail using the contact information noted below. Ship all urine samples in sealed containers on dry ice so they remain frozen. Ship blood samples with ice packs to maintain them as cold as possible without freezing. If immediate shipping is not possible, store urine samples frozen and store blood samples refrigerated. Ship as expeditiously as possible to maintain temperature control of the samples.

A. Ship to:

Commander
US Army Medical Research Institute of Chemical Defense
ATTN: MCMR-UV-PA/Analytical Chemistry
3100 Ricketts Point Road
Aberdeen Proving Ground, MD 21010-5400

B. Contact Information:

Duty Hours: 0730-1630, Monday-Friday
Phone: 410-436-4254 or 410-436-2173, DSN 584-4254 or 584-2173
E-mail: mricdbiosamples@APG.AMEDD.ARMY.MIL

Off-duty Hours: Staff Duty Officer (SDO), cell phone 410-322-6822.

C. Documents to be Included with the Shipping Package

1. Incident Report Form: A blank Incident Report Form is provided at Appendix F. Enclose the information requested on this form in the shipping package, inserted inside a plastic bag to protect from moisture.

2. DD Form 1911, Materiel Courier Receipt: The DD Form 1911 (page E-6) is a chain of custody form that is initiated at the sample collection point and accompanies the samples. An example of how to fill out the DD Form 1911 is provided on page E-7.

E-5. Sample Analysis: Turn-Around Time (From Receipt of Sample at USAMRICD)

TEST	SAMPLE	TURN-AROUND TIME
Sulfur Mustard (thiodyglycol)	Urine[1]	72 hours[2]

[1]Urine samples are the primary specimen needed for Sulfur Mustard (thiodyglycol) assays.

[2]Results of any assays performed at USAMRICD will be reported back to the requesting physician and to the Deployment Environmental Surveillance Program at USACHPPM. The requesting physician is responsible for ensuring the results are recorded in the individual medical record.

E-6. Biomedical Sample Collection Kit (packing list) for CW Verification

Item	Unit	Quantity
Urine Collection:		
urine collection containers w/lids	ea	5
plastic transfer pippette	ea	10
Blood Collection:		
Vacutainer Tubes w/EDTA, 10ml, Becton Dickinson #366457	ea	5
Misc.		
nitrile exam gloves, medium, Safeskin #57067	pr	1
tamperproof seals	ea	10
storage/packaging/shipping container	ea	1
ColdPacks	ea	2
plastic bags	ea	5
Documents:		
Sample Collection SOP	ea	1
Chain of Custody Form (DD1911) Blank	ea	2
Chain of Custody Form (DD1911) Example	ea	1
Incident Report Form	ea	2
USAMRICD shipping label	ea	2

MATERIEL COURIER RECEIPT

SHIPPER'S CONTROL/DOCUMENT NO.

SHIPPER — SUPPLY ACCOUNT NUMBER

DESTINATION — SUPPLY ACCOUNT NUMBER

I certify by my signature that I have received the materiel listed on this form and am aware of the applicable safety and security requirements.

SHIPMENT TRANSFERS

FIRST	LOCATION OF TRANSFER	DATE (YR/MO/DAY)
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.	
SIGNATURE	SOCIAL SECURITY NUMBER	
SECOND	LOCATION OF TRANSFER	DATE (YR/MO/DAY)
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.	
SIGNATURE	SOCIAL SECURITY NUMBER	
THIRD	LOCATION OF TRANSFER	DATE (YR/MO/DAY)
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.	
SIGNATURE	SOCIAL SECURITY NUMBER	
FOURTH	LOCATION OF TRANSFER	DATE (YR/MO/DAY)
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.	
SIGNATURE	SOCIAL SECURITY NUMBER	
FIFTH	LOCATION OF TRANSFER	DATE (YR/MO/DAY)
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.	
SIGNATURE	SOCIAL SECURITY NUMBER	

PRIVACY ACT STATEMENT

AUTHORITY 5 U.S.C., Sec 552a (PL 93-579)
PRINCIPLE PURPOSES: To provide a receipt for transfer of controlled material. The use of the SSAN is required and is necessary to provide positive identification of the individuals receipting for the materiel.
ROUTINE USES: To document transfer of materiel from a shipper to a courier, courier to courier and/ or receiver.
DISCLOSURE IS VOLUNTARY: Since the SSAN must be used, refusal to provide SSAN may be grounds for action to remove the individual concerned from duties involving the materiel transferred by use of this form.

SHIPMENT DESCRIPTION

LINE NUMBER	QUANTITY	SERIAL NUMBERS	REMARKS

DD FORM 1911, MAY 82 — PREVIOUS EDITION MAY BE USED UNTIL 31 DEC 82. — USAPPC V1.01

MATERIEL COURIER RECEIPT

SHIPPER'S CONTROL/DOCUMENT NO

SHIPPER: Umatilla Health Clinic, Oregon

SUPPLY ACCOUNT NUMBER

DESTINATION: USAMRICD APG, MD

SUPPLY ACCOUNT NUMBER

I certify by my signature that I have received the material listed on this form and am aware of the applicable safety and security requirements

PRIVACY ACT STATEMENT

AUTHORITY 5 U.S.C. Sec 552a (PL 93-579)
PRINCIPLE PURPOSES: To provide a receipt for transfer of controlled material. The use of the SSAN is required and is necessary to provide positive identification of the individuals receipting for the material.
ROUTINE USES: To document transfer of material from a shipper to a courier, courier to courier, and/or receiver.
DISCLOSURE IS VOLUNTARY. Since the SSAN must be used, refusal to provide SSAN may be grounds for action to remove the individual concerned from duties involving the material transferred by use of this form.

SHIPMENT TRANSFERS

	LOCATION OF TRANSFER	DATE (YR/MO/DAY)
FIRST	Umatilla Health Clinic, Umatilla, OR	03/01/31

RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.): Doe, Jane W
ORGAN OR ACCOUNT NO:
SIGNATURE: *Jane W. Doe*
SOCIAL SECURITY NUMBER: 123-45-6789

	LOCATION OF TRANSFER	DATE (YR/MO/DAY)
SECOND	USAMRICD, Bldg E3100, Rm 39, APG, MD 21010-5400	03/01/31

RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.): Smith, John A.
ORGAN OR ACCOUNT NO:
SIGNATURE: *John A. Smith*
SOCIAL SECURITY NUMBER: 987-65-4321

	LOCATION OF TRANSFER	DATE (YR/MO/DAY)
THIRD		

RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)
ORGAN OR ACCOUNT NO
SIGNATURE
SOCIAL SECURITY NUMBER

	LOCATION OF TRANSFER	DATE (YR/MO/DAY)
FOURTH		

RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)
ORGAN OR ACCOUNT NO
SIGNATURE
SOCIAL SECURITY NUMBER

	LOCATION OF TRANSFER	DATE (YR/MO/DAY)
FIFTH		

RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)
ORGAN OR ACCOUNT NO
SIGNATURE
SOCIAL SECURITY NUMBER

SHIPMENT DESCRIPTION

LINE NUMBER	QUANTITY	SERIAL NUMBERS	REMARKS
1	2	Urine Specimens (Frozen)	
2	3	Blood Specimens (Unfrozen)	
		transfer to USAMRICD	
			Received samples at MRICD at 1225. Specimens were contained within a shipping cooler with KoolPacks. Samples were removed from cooler and visually inspected. Blood specimens (unfrozen) ~~were placed in refrigerator; urine specimens (frozen) were placed in~~ –70 C freezer. All seals intact. Room 39 door locked and secured.

DD FORM 1911, MAY 82 — PREVIOUS EDITION MAY BE USED UNTIL 31 DEC 82 — USAPPC V1.01

Appendix F. Incident Report Format for Suspected CW Exposure

Please enclose as much of the following information as possible. Transmit this information as soon as possible to USACHPPM at the contact information below. If shipping biomedical samples, also include this form (inserted inside of a plastic bag to protect from moisture) with the shipment.

US Army Center for Health Promotion and Preventive Medicine
ATTN: MCHB-TS-RDE
5158 Blackhawk Road
Aberdeen Proving Grounds, MD 21010-5422
1-800-222-9698, DSN 584-6096; or commercial (410) 436-6096
Secure DSN 584- or commercial 410-436-4244
Secure email: OEHdata@usachppm.smil.mil
*Secure web server:*usachppm1.army.smil.mil

Exposure Information:

Describe incident including date/time group, unit, and location of suspected exposure:

Onset date/time and description of clinical symptoms:

Sample collection date/time:

Potential CW agents involved:

Environmental sampling type, location, reading, and date/time:

Protective equipment in use at the time of the incident:

Patient Information:

Name / Rank:

Age / Gender / Social security number:

Unit / UIC:

CW agent-related casualty treatment:

Point of Contact Information:

Name:

Address:

Phone/Fax/E-mail